suddenly became most numerous in 1883, and disappeared in 1884; even in 1883 its caterpillars could hardly be found on the plants they usually feed upon. Some hostile influence had prevented its further multiplication. Similar facts have been observed in the case of Mammalia as well. The *Spermophilus citillus* is usually met with about Sarepta; but sixty years ago it suddenly disappeared in the course of one summer—probably succumbing to some contagious disease. During the following years it could hardly be found, but by and by it multiplied again to such an extent that each inhabitant of Sarepta had to undertake to kill every year a certain number of the *Spermophilus*. Their numbers were diminished, but still they are very numerous in the steppes, thus illustrating the small importance of even a systematic attempt at extermination, as compared with the importance of natural checks. Many birds suddenly appear in great numbers, and as suddenly disappear. The *Merula rosea* for several years nested in very great numbers at Sarepta. Mr. Becker also mentions interesting facts as to a yellow dust which spread over Saratoff in April 1864, and must have been brought from Central Asia. Under microscopical examination, it was found to contain a great number of germs and Infusoria. The seeds of *Typha stenophylla*, which formerly was never found at Sarepta, must have been imported quite recently by wind, either from Caucasia or Siberia. In the course of one summer this pretty plant became numerous in a pond in the Ergheni Hills, but it disappeared next year. As a rule, a decrease of all kinds of insects is noticed about Sarepta, and it can be explained only by the general conditions of weather resulting in indifferent crops, and a general diminution of hay-crops in the surrounding steppes.

A COMPREHENSIVE paper upon the simpler derivatives of hydroxylamine, NH_2OH, by Drs. Behrend and Leuchs, will be found in the current number of *Liebig's Annalen* (p. 203). The great interest with which hydroxylamine derivatives have recently been invested by the discovery among them of geometrical isomers, and the considerable importance of hydroxylamine as a reagent for investigating the constitution of organic compounds, rendered it very desirable that something more definite should be ascertained regarding the compounds obtained by replacing the hydrogen of hydroxylamine by simple organic radicles, than the few isolated facts hitherto acquired. There are five types of derivatives possible, which are classified as follows, R representing a monad radicle: $H_2N—OR$ α-monalkyl, $RHN—OH$ β-monalkyl, $RHN—OR$ α-dialkyl. $R_2N—OH$ β-dialkyl, and $R_2N—OR$ trialkyl hydroxylamine. In the case of the radicle benzyl, $C_6H_5—CH_2—$, a complete series of such compounds have been prepared and fully investigated. The first member of the series, α-benzylhydroxylamine, $H_2N—OC_7H_7$, was prepared some time ago by Janny, and Drs. Behrend and Leuchs utilized Janny's reaction, improved very considerably in its details, in order to prepare this substance in quantity. The reaction consists in warming hydrochloric acid with the benzyl derivative of the well-known acetone compound of hydroxylamine, acetoxin, $(CH_3)_2C{=}NOH$. Its course may be represented by the equation $(CH_3)_2C{=}NOC_7H_7 + HCl + H_2O = H_2N—OC_7H_7 . HCl + (CH_3)_2CO$. The hydrochloride thus obtained crystallizes in large, flexible, lustrous plates, which sublime at 230°–260° C. without fusion. The free base itself, α-benzylhydroxylamine, $H_2N—OC_7H_7$, is a liquid which cannot be distilled at the ordinary pressure without decomposition, but at a pressure of 30 mm. distils unchanged at 118°–119°. It may also be safely distilled in steam. α-dibenzylhydroxylamine, $H(C_7H_7)N—O(C_7H_7)$, is readily obtained from the mono-compound just described by the limited action of benzyl chloride. It is also liquid at the ordinary temperature, and more difficultly volatilizable even in steam than the mono-compound. Its hydrochloride crystallizes well from alcohol in glittering needles. The di-compound is readily transformed by further action of benzyl-chloride into tribenzylhydroxylamine, $(C_7H_7)_2N—OC_7H_7$. The tri-compound is likewise a liquid, and is not volatile without decomposition even *in vacuo*. Its hydrochloride is readily and completely decomposed by water. The β-mono-compound, $(C_7H_7)HN—OH$, is obtained by boiling the α-di-compound with concentrated hydrochloric acid, or heating the two together in a sealed tube to 130°. $(C_7H_7)HN—O(C_7H_7) . HCl + HCl = C_7H_7HN—OH . HCl + C_7H_7Cl$. The free base, which is liberated as an oil upon addition of sodium carbonate solution to the concentrated solution of the hydrochloride, crystallizes on standing, and gives well-developed crystals on recrystallization from petroleum-ether. It also reduces Fehling's solution, in these two points differing markedly from the liquid α-mono-compound. The β-di-compound is best obtained by boiling hydroxylamine hydrochloride, benzyl chloride, and soda crystals with alcohol for an hour, using a reflux condenser. On cooling, crystals of the solid base are deposited, which melt at 123°. The preparation of this complete series shows in a very striking manner the different effects of substituting alkyl radicles for the hydrogen attached to nitrogen or for the hydroxylic hydrogen. The α-compounds are both liquids, while the β-derivatives are solids. The alkyl radicle replacing hydroxylic hydrogen is also very much more easily detached by the action of hydrochloric acid than that attached to nitrogen. It is also interesting to note that the basic character of hydroxylamine diminishes with the number of alkyl radicle groups introduced.

THE additions to the Zoological Society's Gardens during the past week include a Masked Parrakeet (*Pyrrhulopsis personata*) from the Fiji Islands, presented by Mr. Geo. Lawson; a Lanner Falcon (*Falco lanarius*), European, presented by Miss Marjorie Barnard; three Common Vipers (*Vipera berus*), British, presented by Mr. A. W. Cotton; two Andaman Starlings (*Sturnia andamanensis*) from the Andaman Islands, three Ceylon Fish-Owls (*Ketupa ceylonensis*) from Ceylon, six Tufted Ducks (*Fuligula cristata* 3 ♂ 3 ♀), European, purchased; a Great Bustard (*Otis tarda* ♀), European, received in exchange; two Japanese Deer (*Cervus sika* ♂ ♂), two Barbary Wild Sheep (*Ovis tragelaphus* ♂ ♀), a Burrhel Wild Sheep (*Ovis burrhel*, ♂), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

OBJECTS FOR THE SPECTROSCOPE.

Sidereal Time at Greenwich at 10 p.m. on June 5 = 14h. 57m. 6s.

Name.	Mag.	Colour.	R.A. 1890.	Decl. 1890.
			h. m. s.	° ′
(1) G.C. 4045	—	—	15 0 54	+ 2 2
(2) G.C. 4058	—	—	15 3 24	+56 11
(3) 342 Birm.	4·5	Reddish-yellow.	14 55 50	+66 22
(4) ν_1 Serpentis	5	Reddish-yellow.	15 20 41	+15 49
(5) μ Virginis	4	Whitish-yellow.	14 37 18	− 4 49
(6) R Ursæ Majoris ...	Var.	Reddish.	10 36 51	+69 21

Remarks.

(1) The spectrum of this nebula has not been recorded. In the General Catalogue it is described as: "Very bright; pretty large; round; pretty suddenly much brighter in the middle to a nucleus; following of two." The companion is apparently very faint.

(2) This is a bright oval nebula under the body of Draco. Smyth states that it is "rather faint at the edges, but not so as to obscure the form." The General Catalogue description is "Very bright; considerably large; pretty much extended in the direction 146°; gradually brighter in the middle." In 1848

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Lord Rosse observed a longitudinal rift, but this has not been confirmed by later observations. According to Dr. Huggins, the spectrum is continuous, but it is not at all unlikely that further observations may show that it is not entirely so. The whole nebula appears to resemble that in Andromeda, even to the dark rift, and we now know that the spectrum in that case is not perfectly continuous. Intending observers of this class of nebula spectra will do well to examine the spectrum of Comet Brooks, which was referred to in last week's notes. The spectrum of the comet is apparently continuous at first sight, but careful observation shows beyond question the existence of the usual flutings of carbon. These flutings may also be expected in the nebulæ having so-called "continuous" spectra.

(3) D'Arrest likens the spectrum of this star to that of β Pegasi, but Dunér thinks it more like α Herculis. All the bands 1–9 are very strongly marked, and are wide and dark. Observations similar to those suggested for other stars of the group are required.

(4) According to Vogel, this star has a well-marked spectrum of the solar type, but Dunér classes it with stars of Group II. He states that the bands 1–8 are seen, but that they are narrow and not very dark, 4 and 5 appearing as lines. He also suggests that the spectrum is an intermediate one between Group II. and Group III. As I have pointed out on previous occasions, it is these intermediate stages which require a detailed study. It is pretty certain that the passage from one group to another will not be abrupt, but that there will be intermediate stages between each successive two. The star in question is probably slightly less advanced in condensation than Aldebaran.

(5) This is a star of Group IV. (Konkoly), but in addition to the hydrogen lines, D and *b* are distinctly visible. The usual observations are required.

(6) The range of this variable is from 6·0–8·1 at maximum to 13·2 at minimum, in a period of about 302 days. The increase of light is very rapid, whilst the decrease is slow and irregular (Sawyer). The spectrum is a fine one of Group II., the bands 1–9 being wide and dark; 7 and 8 are especially remarkable (Dunér). The usual bright lines which are now expected to appear at the maxima of stars of this class should be looked for. The maximum will occur about June 12.

A. FOWLER.

ACTINIC LIGHT OF THE SOLAR CORONA.—Prof. Frank H. Bigelow, in *Bulletin* No. 15 of the United States Scientific Expedition to West Africa, dated April 19, 1890, gives an interesting note on the law of distribution of the actinic light of the solar corona. His paper on "The Solar Corona, discussed by Spherical Harmonics," noted in NATURE, vol. xli. p. 595, assumed that the surface distribution of the electro-magnetic potential was expressed by C cos θ, the constant representing the maximum, and θ the angular distance from the coronal pole; the visible lines of the corona being shown to coincide in direction with the lines of force generated under these conditions. It is now suggested that the corresponding equipotential lines denote the position and direction of the surfaces of iso-actinism as referred to the same pole, or, in other words, that the actinic brightness is directly proportional to the potential. From the discussion it follows that the poles become the critical points for examination as to the actinic intensity of the corona; the sky in the neighbourhood should also be examined with great care; these two results, combined with the visible linear distance of the contour of merging of the polar rays in the sky light, in terms of the radius of the sun corrected from the covering lunar disk when taken in combination with the formula for these surfaces, will enable the whole of the coronal light to be discussed as simple phenomena.

ON THE ROTATION OF THE SUN.—Prof. N. C. Dunér has made a series of observations of the displacement of lines in the spectrum at the eastern and western edges of the sun for the purpose of deducing the time of rotation (*Astr. Nach.*, 2968). The observations were made from 1887–89 with a Rowland grating spectroscope of high power attached to the refractor of Lund Observatory, the distances between several lines in the a group of the solar spectrum at opposite edges of the sun being micrometrically determined. The results of the measures are given in the following table, where ϕ is the heliocentric latitude of the points on the sun's edge, v the velocity in kilometres with which the point on the edge approaches the earth, ξ the angle of rotation in 24 hours, and n the number of measures made in the different years:—

ϕ. °	v.	ξ cos ϕ. °	ξ. °	n.
0·4	1·98	14·14	14·14	107
15·0	1·85	13·19	13·66	104
30·0	1·58	11·31	13·06	104
45·0	1·19	8·48	11·99	106
60·0	0·74	5·31	10·62	107
74·8	0 54	2·45	9·34	107

These values of ξ, deduced from spectroscopic observations, show that the equatorial zone of the solar surface has a shorter time of rotation than zones in higher latitudes, the results agreeing with those found from sun-spot observations. The advantage of the method used by Prof. Dunér, however, lies in the fact that it allows observations of rotation to be made in the neighbourhood of the poles. A comparison of the spectroscopic and the spot observations shows that the former gives a slightly smaller velocity of rotation than the latter.

It may be remembered that the work done under the direction of Prof. Rowland at Baltimore showed that "the absorbing layer of gases by which the Fraunhofer lines are formed does not behave like the sun-spots, but is slightly retarded at the sun's equator."

PULKOVA OBSERVATORY.—The magnificent volume issued in commemoration of the jubilee of the Pulkova Observatory has been received. In the volume an account is given of the 30-inch refractor and the Astro-physical Laboratory, and the twelve plates which illustrate it are worthy representations of an enviable reality. It is hardly necessary to say that the history of the Observatory is fully delineated, and that technical descriptions of the instruments are given, whilst Hermann Struve gives a long account of the determination of the instrumental constants. A *résumé* is also given of the work done in the Astro-physical Laboratory, and a comprehensive bibliography of the various astronomical, geodetical, and other studies that have been completed. Indeed, the whole of the splendidly finished work is a fitting memento of the jubilee that it celebrates.

TELLURIC LINES OF THE SOLAR SPECTRUM.—M. J. Janssen presented a note to the Paris Academy, on May 27, relative to some results he has obtained during a stay in Algeria, where he has been for about four months investigating the action of the atmosphere on the solar spectrum by means of photographs taken when the sun is on the meridian and horizon. The photographs were taken with the aid of a Rowland's grating, and isochromatic plates were used in order to obtain records of the less refrangible portions of the spectrum. The work is not yet finished, but M. Janssen notes that, without the purity of the heavens in Algeria and the continuance of favourable days, it would have been impossible to obtain any results.

BROOKS'S COMET (*a* 1890).—The following ephemeris computed by Dr. Bidschof is given in *Astronomische Nachrichten*, No. 2969:—

1890.	R.A. h. m. s.	Decl. ° ′	Log r.	Log Δ.	Brightness.
June 4	18 56 29	+60 46·8	0·2816	0·1958	3·57
5	48 0	61 28·7			
6	39 9	62 7·9			
7	29 54	62 44·3			
8	20 17	63 17·8	0·2820	0·1978	3·53
9	10 20	63 48·1			
10	0 3	64 15·1			
11	17 49 30	64 38·7			
12	38 44	64 58·6	0·2827	0·2027	3·44
13	27 48	65 14·8			
14	16 44	65 27·5			
15	5 37	65 36·6			
16	16 54 31	65 42·1	0·2837	0·2102	3·31
17	43 29	65 44 0			
18	32 35	65 42·6			
19	21 53	65 37·7			
20	11 25	65 29·5	0·2849	0·2200	3·15

The brightness at discovery has been taken as unity.

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